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INTELLECTUAL PROPERTY
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Commissioner for Patents
Box: 1450
Alexandria, VA 22313-1450

RE: PATENT OF HERZINGER ET AL. TITLED " ODD BOUNCE IMAGE ROTATION SYSTEM IN ELLIPSOMETER SYSTEMS ";
PATENT NO.: 6,795,184;
ISSUE DATE: SEP. 21, 2004;
SERIAL NO.: 09/963,573;
APP. DATE: SEP. 26, 2001.

REQUEST FOR CERTIFICATE OF CORRECTION

Dear Sir;

Please find enclosed a check for $100.00 along with this request that it be acknowledged that Claims 1 and 6 should have a ";" between the words "system" and "analyzer" in Line 5 of Claim 1, and in Line 7 of Claim 6.

Accompanying herewith is a copy of Col. 6 of the Issued Patent showing clearly that the Specification describes:

a stage for supporting a sample system

and

an analyzer which is fixed in position during data acquisition

as being different elements. Those skilled in the art would make no sense of a "stage for supporting a sample system analyzer" and know that a sample system and an analyzer are separate elements.

Also enclosed are copies of Claims Pages as down-loaded from the PTO Website. It is clear that the "stage for supporting a sample" and the "analyzer" were presented on different lines in the Claims and thus were indicated to be separate elements just as they were in the Specification. However, a ";" was inadvertently left out after the word "sample" in Line 5 of Claim 1, as it was in Line 7 of Claim 6. This was purely a clerical error and resulted in the Issued Patent Claims running Claim 1 lines 5 and 6 together and Claim 6 Lines 7 and 8 together as printed in the Issued Patent. A copy of the Patent Claims 1 and 6 is also accompanying to indicate the problem.

Again, as this is the result of a purely clerical error, in combination with how the PTO print setter interprets punctuation, and does not in any way concern the substantive aspects of the Patent, it is respectfully requested that a Certificate of correction be Issued stating:

add a ";" after the word "system" in Claim 1 Line 5

and

add a ";" after the word "system" in Claim 6 Line 7.

This is necessary to make the Claims consistent with the Specification Col. 6 Line 43 and 44 which is absolutely clear that the word "analyzer" should not have been run together with the word "system" in Claims 1 and 6.

I was and am the Attorney in this case and attest that there was no deceptive intent or intent that the words "system" and "analyzer" should have been run together. I attest that it was purely a clerical error in combination with how the PTO print setter works that led the to the problem it is now requested by corrected.

Sincerely,

JAMES D. WELCH
Reg. No. 31,216
JW/hs
enc.

CERTIFICATE OF MAILING

I HEREBY CERTIFY THAT THIS TRANSMITTAL IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE WITH SUFFICIENT POSTAGE FOR FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO THE COMMISSIONER FOR PATENTS, BOX: 1450, ALEXANDRIA VA. 22313-1450 ON THE DATE INDICATED BELOW.

JAMES D. WELCH 7/23/08 DATE

and in a direction which is not significantly deviated or displaced from the locus of the input beam, even when the odd bounce optical image rotating system is caused to stepwise or continuously rotate about an axis coincident with the locus of the beam of electromagnetic radiation. The same is generally true for an odd bounce optical image rotating element system comprising any odd number, (eg. 3, 5, 7 etc.) of reflective elements. It is noted that the greater the number of reflective elements the more normal the angle of incidence a beam can make thereto, and higher angles of incidence cause less aberration effects. Also, where more than three reflection elements are present certain non-idealities caused by the reflection elements can be canceled by utilizing non-coincident coordinate systems for said reflections. A trade-off, however, is that the greater the number of reflective elements present, the more difficult it is to align the system to avoid said beam deviation and displacement.

Coupling the odd bounce optical image rotating system with a substantially linear polarizing polarizer provides a polarizer system in which the substantially linear polarizing polarizer can remain stationary while the azimuthal angle of a substantially linearly polarized beam of electromagnetism exiting therefrom, (as viewed from a position along the locus of an electromagnetic beam caused to enter thereto), is rotated.

For general insight, it is also noted that a single three-hundred-sixty (360) degree rotation of a present invention odd bounce optical image rotating element system about an axis coincident with a beam of electromagnetic radiation which functionally passes therethrough, causes seven-hundred-twenty (720) degrees of rotation of the major intensity orthogonal component. This is not of any critical consequence, but is mentioned as it must be taken into account during practice of present invention methodology.

In the context of a material system investigation system, (eg. ellipsometer, polarimeter etc.), sequentially comprising:

source of electromagnetic radiation;

substantially linear polarizer;

stage for supporting a sample system analyzer; and

detector;

the present invention teaches the presence of at least one odd bounce optical image rotating system being present between said substantially linear polarizer and said stage for supporting a sample system and/or between said stage for supporting a sample system and said analyzer, said at least one odd bounce optical image rotating system comprising an odd number of at least three reflective elements; such that a beam of electromagnetic radiation provided by said source of electromagnetic radiation, after passing through said substantially linear polarizer, interacts with a sample system place on the stage for supporting a sample system passes through said analyzer before entering said detector, said beam of electromagnetic radiation further interacting with each of said odd number of reflective elements of said at least one odd bounce optical image rotating element, and exiting therefrom along a substantially non-deviated non-displaced trajectory.

Again, the odd bounce optical image rotating system can consist of any odd number of reflective elements, with three (3) and five (5) being preferred in the practical sense.

The present invention also includes a method of obtaining data, comprising the steps of:

a. providing a system which comprises an odd bounce optical image rotating system, as described above;

b. causing a beam of electromagnetic radiation to exit said source of electromagnetic radiation, interact with said substantially linear polarizer, a sample system and said analyzer prior to entering said detector, and in addition interact with said at least one odd bounce optical image rotating element without significant change in trajectory;

c. collecting output signals from said detector.

An additional step can further comprise the step of causing the at least one odd bounce optical image rotating element to rotate, step-wise or continuously, around the locus of the trajectory of the electromagnetic beam while practicing step c. Note, where the rotation is step-wise, motion is stopped during data acquisition.

In addition, said material system investigation system, (eg. ellipsometer, polarimeter etc.), can be caused to include a rotating compensator which during use in collecting data is caused to continuously rotate about a locus of an electromagnetic beam passing therethrough, while the substantially linear polarizer and analyzer are held essentially fixed in position and the present invention odd bounce optical image rotating element is caused to be stepped through a series of rotation positions around the locus of the beam of electromagnetic radiation caused to pass therethrough, (and held motionless during data acquisition). This allows collecting data at multiple substantially linear polarization state azimuthal angle orientations, much as is typically effected by stepwise rotating a linear polarizer, (or analyzer). The benefit involved is that, especially in ellipsometer/polarimeter etc. systems which operate in the IR range of wavelengths, it can be difficult to cause rotation of a linear polarizer, (or analyzer), without adversely causing deviation of a beam of electromagnetic radiation caused to pass therethrough, or causing mis-coordination of multiple elements thereof, (ie. multiple tipped wire linear polarizer as described in U.S. Pat. No. 5,946,098). The present invention allows setting fixed substantially linear polarizer, and analyzer azimuthal orientations, and use the odd bounce optical image rotating element instead to effect different electromagnetic beam azimuthal rotation orientations.

specification

Continuing, as mentioned, the present invention finds use in a spectroscopic ellipsometer system basically comprising:

a source of polychromatic electromagnetic radiation;

a substantially linear polarizer which is fixed in position during data acquisition;

a stage for supporting a sample system; (6) n/a present

an analyzer which is fixed in position during data acquisition; and

a multi-element spectroscopic detector system.

wherein the substantially linear polarizer and analyzer can be elements which include a narrow elongated slit therein, through which a beam of random polarization state electromagnetic radiation is caused to pass, to the end that it emerges therefrom as a beam of electromagnetic radiation with a linear polarization imposed thereupon. Further, the substantially linear Polarizer can be a Brewster Angle element in which only a "p" or "s" component of a beam of electromagnetic radiation caused to interact therewith near a "Brewster Angle" Angle-of-Incidence, emerges therefrom in reflection or transmission, respectively; wherein the "p" component indicates a polarization state aligned with a perpendicular to a surface of a Brewster Angle Polarizer and also in the plane of incidence of said beam, and where "s" indicates a polarization components perpendicular to the "p" component and also parallel to said surface of the Brewster Angle Polarizer". While such spectroscopic ellipsometer system can be operated with a continuously rotating polarizer or analyzer during data collection

CLAIMS

I CLAIM:

1. In the context of a material system investigating system sequentially comprising:

source of electromagnetic radiation;

polarizer;

stage for supporting a sample system

analyzer; and

detector;

at least one odd bounce optical image rotating system being present between said polarizer and analyzer, said at least one odd bounce optical image rotating system comprising an odd number of at least three reflective elements oriented such that a beam of electromagnetic radiation provided by said source of electromagnetic radiation, after passing through said polarizer, interacts with each of said at least three reflective elements of said at least one odd bounce optical image rotating system and exits therefrom along a non-deviated non-displaced trajectory, said beam of electromagnetic radiation also interacting with a sample system placed on said stage for supporting a sample system, and said analyzer before entering said detector.

2. A material system investigating system as in Claim 1, in which the at least one odd bounce optical image rotating system consists of a selection from the group consisting of three and five reflective elements.

electromagnetic radiation even when said compensator is caused to rotate about the locus of the beam of electromagnetic radiation, with the result being that retardation is entered between orthogonal components of said input electromagnetic beam of radiation.

6. A method of obtaining data from a material system investigating system comprising the steps of:

a. providing a material system investigating system which sequentially comprises:

source of electromagnetic radiation;

polarizer;

stage for supporting a sample system

analyzer; and

detector;

Same comments as for Claim 1

clerical error in submitted claim

said material system investigating system further comprising at least one odd bounce optical image rotating system being present between said polarizer and analyzer, said at least one odd bounce optical image rotating system comprising an odd number of at least three reflective elements oriented such that a beam of electromagnetic radiation provided by said source of electromagnetic radiation, after passing through said polarizer, interacts with each of said at least three reflective elements of said at least one odd bounce optical image rotating system and exits therefrom along a non-deviated non-displaced trajectory, said beam of electromagnetic radiation also interacting with a sample system placed on said stage for supporting a sample

(RE4') and (RE5') lead to the reflections shown in FIG. 2. FIG. 6*b* further demonstrates physical construction of the FIG. 6*a* five (5) bounce odd bounce image rotating system (OBIRS).

Finally, it is to be understood that while preferred embodiments provide for application of a linear polarizer, the present invention can be used with a substantially linearly polarizing polarizer, or a polarizer which provides partially linearly polarization. In the Claims the term "polarizer" should then be interpreted broadly to mean preferably a linear polarizer, but including polarizers which provide partially linearly polarization.

Having hereby disclosed the subject matter of the present invention, it should be obvious that many modifications, substitutions, and variations of the present invention are possible in view of the teachings. It is therefore to be understood that the invention may be practiced other than as specifically described, and should be limited in its breadth and scope only by the claims.

We claim:

1. In the context of a material system investigating system sequentially comprising:

source of electromagnetic radiation;

polarizer;

stage for supporting a sample system analyzer; and

detector;

at least one odd bounce optical image rotating system being present between said polarizer and analyzer, said at least one odd bounce optical image rotating system comprising an odd number of at least three reflective elements oriented such that a beam of electromagnetic radiation provided by said source of electromagnetic radiation, after passing through said polarizer, interacts with each of said at least three reflective elements of said at least one odd bounce optical image rotating system and exits therefrom along a non-deviated non-displaced trajectory, said beam of electromagnetic radiation also interacting with a sample system placed on said stage for supporting a sample system, and said analyzer before entering said detector.

2. A material system investigating system as in claim **1**, in which the at least one odd bounce optical image rotating system consists of a selection from the group consisting of three and five reflective elements.

3. A material system investigating system as in claim **2**, in which the at least two of the reflective elements are adjustable such that the angle of incidence of a beam of electromagnetic radiation interacting therewith can be controlled.

4. A material system investigating system as in claim **1**, which further comprises a compensator system present between said polarizer and analyzer.

5. A material system investigating system as in claim **4**, in the compensator system comprises, as viewed in upright side elevation, first and second orientation adjustable mirrored elements which each have reflective surfaces; said compensator system further comprising a third element which, as viewed in upright side elevation presents with first and second sides which project to the left and right and downward from an upper point, said third element being made of material which provides reflective interfaces on first and second sides inside thereof; said third element being oriented with respect to the first and second orientation adjustable elements such that in use an input electromagnetic beam of radiation caused to approach one of said first and second orientation adjustable mirrored elements along an essentially horizontally oriented locus, is caused to externally reflect therefrom upwardly vertically oriented, then enter said third element and essentially totally internally reflect from one of said first and second sides thereof, then proceed along an essentially horizontal locus and essentially totally internally reflect from the other of said first and second sides and proceed along an essentially downward vertically oriented locus, then reflect from the other of said first and second adjustable mirrored elements and proceed along an essentially horizontally oriented propagation direction locus which is essentially undeviated and undisplaced from the essentially horizontally oriented locus of said input beam of electromagnetic radiation even when said compensator is caused to rotate about the locus of the beam of electromagnetic radiation, with the result being that retardation is entered between orthogonal components of said input electromagnetic beam of radiation.

6. A method of obtaining data from a material system investigating system comprising the steps of:

a. providing a material system investigating system which sequentially comprises:

source of electromagnetic radiation;

polarizer;

stage for supporting a sample system analyzer; and

detector;

said material system investigating system further comprising at least one odd bounce optical image rotating system being present between said polarizer and analyzer, said at least one odd bounce optical image rotating system comprising an odd number of at least three reflective elements oriented such that a beam of electromagnetic radiation provided by said source of electromagnetic radiation, after passing through said polarizer, interacts with each of said at least three reflective elements of said at least one odd bounce optical image rotating system and exits therefrom along a non-deviated non-displaced trajectory, said beam of electromagnetic radiation also interacting with a sample system placed on said stage for supporting a sample system, and said analyzer before entering said detector;

b. placing a material system on said stage for supporting a sample system;

c. entering an electromagnetic beam to said polarizer from said source of electromagnetic radiation and causing it to impinge upon said material system;

d. detecting a beam of electromagnetic radiation exiting from said analyzer into said detector system.

7. A method of obtaining data as in claim **6**, which further comprises the step of causing the at least one odd bounce optical image rotating system to stepwise or continuously rotate around the locus of the trajectory of the electromagnetic beam while practicing step d.

8. A system for effecting a polarization state change comprising in functional combination:

a fixed position polarizer; and

an odd bounce optical image rotating system comprising a sequence of an odd number of reflective elements oriented in a manner which causes an entering beam of electromagnetic radiation to reflect from a first reflective element thereof onto a second thereof and from the second reflective element thereof onto a third reflective element thereof etc., such that said odd number of reflections cause a beam of electromagnetic radiation to emerge from the last reflective element without being significantly deviated or displaced from the locus of the input beam, even when the odd bounce optical image rotating system is caused to rotate about an axis coincident with the locus of the beam of electromagnetic radiation.

system + analyzer should be on different liner — or add "," between system, analyzer